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ABSTRACT

This pilot study examined the effects of potential "risk" factors on mother-infant interaction using a short-term longitudinal design. Twenty infants were observed in their homes at 3 and 8 months and maternal ratings of infant temperament were obtained. Mothers of infants born after severe obstetric complications held their babies more but engaged them in less playful interaction than control mothers. Mothers who perceived their infants as difficult to handle interacted with their infants less and were less responsive to their social bids. These patterns were reasonably stable over time, and negative maternal perceptions persisted. It was concluded that negative maternal perceptions of infant temperament may constitute a potentially more serious "risk" factor than severe obstetric complications and have implications for the development of later problems. (Author/JMB)

Maternal and Infant Behavior in Normal, High Risk, and "Difficult" Infants

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Abstract

This pilot study examined the effects of potential "risk" factors on mother-infant interaction using a short-term longitudinal design. Twenty infants were observed in their homes at 3 and 8 months and maternal ratings of infant temperament were obtained. Mothers of infants born after severe obstetric complications held their babies more, but engaged them in less playful interaction than control mothers. Mothers who reported that their infants were difficult to handle interacted with their infants less and were less responsive to their social bids. These patterns were reasonably stable over time and negative maternal perceptions persisted. It would appear that negative maternal perceptions of infant temperament may constitute a potentially more serious "risk" factor than severe obstetric complications and have implications for the development of later problems.

Recent research on early identification of populations at risk for later psychopathology has tended to focus on children of disturbed parents (e.g., Mednick & Schulsinger, 1968), while emphasis on specific child characteristics has been limited. On the other hand, earlier research concentrated on obstetric complications as an important precurser of later developmental problems (e.g., Graham, Ernhart, Thurston & Craft, 1962; Pasamanick & Knobloch, 1961). However, follow-up studies of premature infants and infants born after complicated pregnancies and/or deliveries have generally concluded that only a small proportion of these children show evidence of clear-cut learning or behavior problems when they reach school age (e.g., Drillien, 1964). In a recent review article, Sameroff and Chandler(1975) concluded that obstetric complications paired with an inadequate caretaking environment were more likely to place infants "at risk" than either one alone. Further, they suggested that one needs to examine changes in infant-caretaker interaction over time to gain a clearer understanding of normal and abnormal patterns of development. Their review also suggests that particular infant characteristics may constitute an additional set of "risk" factors.

Despite the increasing interest in mother-infant interaction, few studies have compared interaction patterns in normal infants and infants who might be at risk for later developmental deviation. What few studies exist, suggest that infants receive somewhat different patterns of mothering, depending on a variety of infant charac-

teristics although findings do not yet form a coherent picture. Thus, for example, Leiderman (1974) reported that mothers of full-term infants held and smiled at their babies more than mothers of prematures. On the other hand, Beckwith, Cohen, and Parmelee (Note 1) observed two groups of preterm infants differing in risk status and found that infants rated as higher risk on the basis of birth complications and newborn neurological indices were held more while low risk mother-infant pairs engaged in more mutual visual regard. Thus, although results tend to vary from study to study, findings do suggest that factors such as infant risk status, sex, age, and responsiveness influence patterns of caretaking.

Furthermore, several authors have suggested that specific infant temperamental characteristics, in particular high irritability and low adaptability, should influence patterns of caretaking and thus, may place children at risk (Korner, 1971; Moss, 1967; Sameroff & Chandler, 1975; Thomas, Chess, & Birch, 1968). The prospective study of Thomas et al. (1968) suggested that "difficult" infants were more likely than "easy" infants to develop problems requiring psychiatric intervention, although child characteristics interacted with parenting styles to determine outcome. Retrospective studies comparing clinic and non-clinic children have likewise indicated that mothers of clinic groups report a more difficult infancy period (Campbell, 1976; Stewart, Pitts, Craig, & Dieruf, 1966). However, to date, no study has directly compared mother-infant interaction in difficult infants and infants not perceived as difficult.

Thus, the present pilot study employed a short-term longitudinal design to examine mother-infant interaction and maternal ratings of temperament in two potentially "at risk" groups and their matched controls. One group consisted of asphyxiated infants hospitalized at birth in a neonatal intensive care unit with a series of complications placing them at risk for later developmental difficulties. The second risk group was made up of infants who were essentially normal, but who were perceived by their mothers as "difficult." Both risk groups were matched with control infants and observed at home at 3 months and 8 months.

It was of interest to determine whether patterns of mother-infant interaction differed between these high risk and normal groups and whether these patterns were persistent over time. In particular it was asked whether mothers who perceived their infants as difficult would provide less stimulation and be less responsive to their infants social bids. It was assumed that perceptions of the infant as difficult would be associated with a negative pattern of interaction.

Method

Subjects. Twenty infants participated in this study. The five asphyxiated infants, four boys and one girl, were born full-term, but after complicated deliveries. All suffered sufficiently severe birth difficulties to be hospitalized on the neonatal intensive care unit of the Montreal Children's Hospital. Additional complications included seizures, post-natal respiratory distress, and hyperbilirubinemia. The mean one minute and five minute Apgar scores of these

infants were 4.00 and 6.25, respectively indicating that they were grossly abnormal at birth. They were recruited into the study through the Neonatal Follow-up Clinic when their prognosis at three months remained uncertain.

Each asphyxiated infant was matched individually with a normal infant from a pool of 38 infants who were part of a larger study of mother-infant interaction. Normal infants were obtained from pediatricians in private practice who recommended normal, healthy 3-month olds to the project. Infants were matched on sex, birth order, maternal education, maternal age, age in days at the 3 month observation, and as closely as possible on birth weight. These demographic data are summarized in table 1.

Difficult infants were selected from the larger sample of 38 normal 3-month-olds on the basis of maternal ratings of infant temperament on the Carey Infant Temperament Survey (Carey, 1972). They formed an extreme group, rated one standard deviation above the sample mean on the criterion scales of rhythmicity, adaptability, and mood. Five infants met the criteria, one boy and four girls. That is, these five infants were perceived by their mothers as extremely irregular in biological functioning, negative in mood (irritable), and slow to adapt to changes in routine. These difficult infants were likewise matched individually with five infants not rated difficult on the variables outlined in table 1.

Procedure. Infants were observed in their homes at 3 months and 8 months at a time when they were awake, alert and not hungry; both maternal and infant behaviors were coded. At 3 months observations

lasted 30 minutes; at 8 months they lasted 60 minutes. Behaviors of interest today are those which were recorded at both the 3 month and 8 month observations. Scores for most behaviors were derived as the proportion of observation intervals in which that behavior occurred. The exceptions, mutual vocalization and maternal responses to distress, were calculated with infant behavior as the base. Thus, the proportion of infant vocalizations which were paired with a maternal vocalization in the same observation period constituted the mutual vocalization score. The proportion of infant cries immediately followed by a maternal response in the same or next observation interval was calculated as the score for maternal responses to infant distress.

Behaviors coded at both time periods included: mutual vocalization, response to distress, caretaking, look at baby, play with baby, pick up/hold baby, vocalize to baby, and no interaction. Infant behaviors included vocalization, look at mother, smile/laugh, cry/fret, and play. Interobserver reliabilities were determined at both observations and were satisfactory (mean .88 at 3 months, .81 at 8 months).

Infant temperament was measured using the Carey Infant Temperament Survey (Carey, 1972), a scale based on the interview procedures of Thomas, Chess, and Birch (1968), which consists of a number of behaviors rated on 3 point scales, scored to reflect infant activity, rhythmicity, adaptability, mood, approach, threshold, intensity, persistence, and distractibility. Items enquire about everyday behaviors such as infant's response to bathing, diapering, new foods,

new people, and so on. At the conclusion of both observations, mothers were asked to complete the scales based on the infant's current behaviors.

Results

Data were analyzed using a series of 2 X 2 repeated measures ANOVAS to assess group differences and changes over time. Since asphyxiated and difficult infants were not matched on several demographic variables, asphyxiated-control and difficult-control comparisons will be reported separately. Furthermore, due to time limitations, only group differences and group by time interactions will be discussed. (All F ratios are reported for $df = 1/8$).

Asphyxiated and Control Infants. Mothers of asphyxiated infants played less with their babies than control mothers ($F = 8.55$, $p < .05$). However, their responsiveness to infant cries increased from 3 to 8 months, while mothers of control infants showed a decrease. This was reflected in a significant group by time interaction ($F = 6.06$, $p < .05$). There was also a tendency for mothers of asphyxiated infants to spend more time holding their infants ($F = 4.04$, $p < .10$), consistent with the findings of Beckwith et al. (Note 1). The asphyxiated infants were likewise less socially responsive in that they looked at mother less ($F = 27.96$, $p < .01$) and smiled less ($F = 5.66$, $p < .05$). No other behavioral measures differentiated the groups. Furthermore, although there were minimal differences in infant temperament ratings at 3 months, by 8 months the differences had totally disappeared. Behavioral and temperament measures are summarized in tables 2 and 3.

"Difficult" and Control Infants. Comparison between difficult and control infants revealed more differences in maternal behavior. Mothers who rated their babies as difficult at 3 months vocalized to them less ($F = 10.13$, $p < .05$), engaged in less mutual vocalization ($F = 5.94$, $p < .05$), and were less responsive to their infants' cries ($F = 23.67$, $p < .01$) at both 3 and 8 months. Furthermore, at both time periods, they spent more time during the observation session not interacting with their infants ($F = 9.06$, $p < .05$). There was also a trend for mothers of difficult infants to look at their infants less ($F = 3.72$, $p < .10$) and for infants rated difficult to cry more ($F = 5.28$, $p = .06$). Difficult infants also spent more time playing ($F = 11.54$, $p < .01$), while a significant group by time interaction ($F = 8.08$, $p < .05$) indicated a greater increase in play behavior among the difficult babies. Furthermore, post hoc comparisons indicated that difficult infants spent more time engaged in play at eight months than at 3 months ($p < .05$) and more than control infants at either time ($p < .05$).

Maternal ratings of infant temperament also showed many differences. Mothers of difficult infants rated them as significantly more irregular ($F = 14.77$, $p < .01$), less adaptable ($F = 25.60$, $p < .01$), less ready to approach new situations and people ($F = 42.56$, $p < .01$) and more negative in mood ($F = 11.75$, $p < .01$) at both time periods. A significant group by time interaction for ratings of adaptability ($F = 6.27$, $p < .05$) indicated more pronounced non-adaptability among difficult infants at 3 months. (See table 3).

Discussion

These findings indicate that infants comprising potentially

high risk groups do in fact receive somewhat different patterns of mothering than normal infants. Moreover, infant responsiveness as well as maternal perceptions and expectations of infant behavior appear to interact to influence maternal behavior. Furthermore, maternal perceptions of infant temperament appear to have somewhat more serious consequences for the type of mothering infants receive than do severe obstetric complications.

Mothers of infants who suffered asphyxia and other birth complications engaged their infants in less play, However, they also showed a tendency to hold their infants more and they became more responsive to their infant's cries over time. These high risk infants for their part, were less socially responsive than their non-risk controls. However, their mothers did not spend less time in interaction with them. Rather, the nature of mother-infant interaction in these normal and asphyxiated groups differed. Mothers of high risk infants were more likely to engage their babies in affectionate physical contact than to stimulate them by bouncing, tickling, or other forms of playful interaction. Presumably, these mothers of infants with severe birth complications were wary of over-stimulating their infants and tended to handle them somewhat more gently and protectively than did control mothers.

These findings are consistent with those of Beckwith et al. (Note 1), who found that mothers of high risk prematures held their infants more than did mothers of low risk prematures. They are also congruent with Osofsky's (1976) report that more responsive infants received more cognitive stimulation, since control infants, who

smiled and looked at mother more, received more playful interaction. Thus, it appears that maternal expectations as well as infant behavior influence mother-infant interaction patterns.

The data from the difficult infants and their controls suggest that negative maternal perceptions of infant temperament are quite stable from 3 to 8 months and that they influence maternal behavior in ways which do not lead to optimal mothering. Mothers who perceive their babies as negative in mood, non-adaptable, and irregular are less responsive to their infant's social bids both positive and negative, at both time periods. Furthermore, they spend less time engaged in interaction with their infants; this is partly reflected in lower rates of vocalization and looking at baby. Despite this, difficult infants play more, presumably because they spend more time alone with toys and not engaged in social interaction. They also tend to cry more, However. it is unclear whether their crying reflects maternal insensitivity to infant signals (Bell & Ainsworth, 1972) or whether lowered maternal responsiveness results because the infants are difficult to soothe. The large number of negative ratings of temperament paired with the pattern of low maternal responsiveness tends to suggest the former. This interpretation is bolstered by the paucity of differences between difficult infants and their controls on the observational measures. On the other hand, both infant crying and maternal ratings of negative mood decreased over time in this group, though not significantly so, suggesting that these maternal ratings were reflecting something of the infant's ongoing behavior.

One implication of these findings for the development of child psychopathology is that negative maternal perceptions of infant temperament may have long-term consequences for the mother-child relationship. It would appear also that maternal expectations partly influence their perceptions of their infants, independent of actual infant behavior. Thus, mothers of severely damaged infants were accepting of their babies relatively lower social responsiveness. On the other hand, the association between negative maternal perceptions and lowered maternal responsiveness, in the light of the few behavioral differences between difficult and control infants, suggests that the mothers who rated their infants as difficult had unrealistic expectations of infant behavior and limited tolerance for even a normal amount of infant crying and fussing. Better preparation for parenting along with screening for mother-infant conflict in primary care facilities is an obvious implication of these results.

Reference Note

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Table 1

Demographic Variables

	Asphyxiated		Control		Difficult		Control	
Variables	MEAN	SD	MEAN	SD	MEAN	SD	MEAN	SD
Birth Weight (oz.)	111.80	25.97	119.80	17.78	111.10	9.34	115.90	15.53
Age in days (3 mos)	104.20	8.50	102.80	7.46	100.20	10.23	100.20	10.89
Age in days (8 mos)	249.80	3.11	248.60	5.46	255.40	8.82	251.60	3.91
Maternal Education[1]	3.80	1.48	3.20	.84	3.80	1.30	2.80	1.10
Maternal Age	26.40	3.05	26.60	3.65	27.40	5.18	26.60	1.67

[1]Unweighted Hollingshead Score.

Table 2

Means and Standard Deviations of Behaviors

Observed at Three and Eight Months

	Asphyxiated Infants				Control Infants				Difficult Infants				Control Infants			
	Three Months		Eight Months		Three Months		Eight Months		Three Months		Eight Months		Three Months		Eight Months	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Maternal Behavior																
caretaking	.38	.35	.09	.14	.35	.13	.08	.06	.39	.24	.12	.12	.51	.28	.07	.03
look at baby	.86	.14	.69	.24	.84	.24	.62	.27	.63	.19	.56	.37	.80	.21	.75	.16
play	.15	.13	.08	.05	.29	.19	.18	.14	.25	.08	.15	.08	.27	.15	.24	.17
hold	.62	.14	.25	.30	.50	.19	.11	.05	.41	.25	.14	.15	.45	.20	.06	.03
vocalize	.71	.30	.50	.29	.81	.34	.52	.24	.61	.14	.32	.26	.79	.17	.59	.18
response to cry	.84	.29	.93	.11	.93	.10	.79	.19	.69	.36	.68	.30	1.00	.00	.93	.08
mutual vocalize	.67	.27	.55	.34	.77	.39	.52	.30	.47	.17	.38	.19	.78	.19	.62	.13
no interaction	.12	.13	.27	.21	.12	.19	.30	.28	.31	.22	.38	.33	.09	.13	.21	.14
Infant Behavior																
vocalize	.42	.12	.55	.13	.53	.17	.49	.07	.54	.27	.43	.22	.46	.15	.39	.18
look at mother	.51	.13	.26	.12	.62	.15	.36	.15	.58	.19	.33	.13	.67	.26	.29	.19
smile	.27	.18	.16	.10	.49	.30	.24	.10	.43	.16	.16	.09	.42	.09	.24	.12
cry	.22	.14	.05	.07	.24	.13	.09	.08	.37	.16	.13	.10	.18	.08	.10	.07
play	.72	.15	.89	.11	.78	.20	.83	.03	.69	.23	.85	.14	.68	.37	.67	.35

Table 3

Means and Standard Deviations of Maternal

Temperament Ratings at Three and Eight Months

	Asphyxiated Infants				Control Infants				Difficult Infants				Control Infants			
	Three Months		Eight Months		Three Months		Eight Months		Three Months		Eight Months		Three Months		Eight Months	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Activity	1.60	.32	1.74	.28	1.53	.19	1.69	.27	1.33	.39	1.71	.15	1.47	.14	1.80	.22
Rhythmicity[1]	.61	.39	.24	.17	.34	.24	.32	.23	.92	.11	.64	.22	.20	.28	.40	.47
Adaptability[1]	.52	.16	.31	.15	.31	.14	.28	.23	.82	.33	.61	.13	.23	.16	.41	.33
Approach	.97	.28	1.37	.42	1.48	.38	1.50	.55	1.10	.37	1.07	.42	1.52	.38	1.52	.44
Threshold	1.26	.24	1.29	.25	1.16	.49	1.26	.19	1.58	.44	1.35	.22	1.22	.30	.97	.28
Intensity	.83	.55	1.05	.28	1.12	.39	.90	.20	1.03	.48	1.20	.31	.83	.13	1.07	.45
Mood[1]	.48	.15	.42	.07	.36	.11	.43	.17	.80	.16	.67	.20	.43	.23	.51	.39
Distractibility	1.42	.15	1.40	.31	1.33	.38	1.56	.34	1.17	.24	1.36	.20	1.26	.47	1.47	.44
Persistence	1.46	.23	1.56	.41	1.30	.47	1.32	.30	1.48	.30	1.09	.46	1.08	.71	1.05	.42

[1]Low score reflects more positive rating.